

Chapter 12- Protein Synthesis Worksheet

Protein synthesis is a complex process made up of the 2 processes transcription and translation. In this activity you will trace the steps that are involved in protein synthesis.

A. Transcription

Protein synthesis begins with DNA in the nucleus. Transcription takes place in the nucleus of the cell. During transcription messenger RNA (mRNA) reads and copies DNA's nucleotide sequence in the form of a complimentary RNA strand. Then the mRNA carries the DNA's information in the form of codons to the ribosome. Codons are a 3 nucleotide sequence in an mRNA strand. At the ribosome, amino acids will be assembled to form a polypeptide, which will become a protein.

Below is a DNA sequence. Write the sequence of mRNA codons that would result from the transcription of the DNA sequence.

DNA: 1 2 3 4 5 6 7 8 9 10
 ACA ATA TAG CTT TTG ACG GGG AAC CCC ATT

mRNA: _____

B. Translation

Translation takes place on the ribosome. For translation, another type of RNA called transfer RNA (tRNA) is needed. tRNA is a molecule made up of 3 nucleotides called anticodons. Anticodons are complimentary to the codons of mRNA. Attached to the tRNA anticodons are amino acids. During translation a tRNA anticodon will bind to a specific mRNA codon and bring with it the specific amino acid coded for. As tRNA bring amino acids, the amino acids bond together forming polypeptide chains, which will form proteins.

Rewrite your mRNA sequence from part A. Using the amino acids table, determine the sequence of amino acids based on your mRNA strand. Use hyphens (dashes) to separate amino acids.

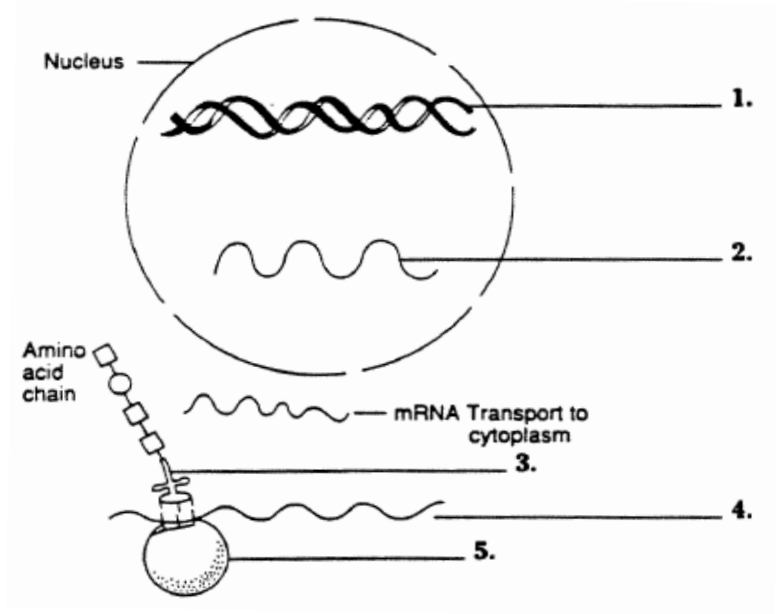
mRNA: _____

tRNA: _____

		Second Base in Code				
		A	G	U	C	
First Base in Code	A	Lysine Lysine Asparagine Asparagine	Arginine Arginine Serine Serine	Isoleucine Methionine Isoleucine Isoleucine	Threonine Threonine Threonine Threonine	A G U C
	G	Glutamic acid Glutamic acid Aspartic acid Aspartic acid	Glycine Glycine Glycine Glycine	Valine Valine Valine Valine	Alanine Alanine Alanine Alanine	A G U C
	U	STOP STOP Tyrosine Tyrosine	STOP Tryptophan Cysteine Cysteine	Leucine Leucine Phenylalanine Phenylalanine	Serine Serine Serine Serine	A G U C
	C	Glutamine Glutamine Histidine Histidine	Arginine Arginine Arginine Arginine	Leucine Leucine Leucine Leucine	Proline Proline Proline Proline	A G U C

Label the following diagram of Protein Synthesis.

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____



Answer the following questions about Protein Synthesis.

Part A

- 6 Define translation.
- 7 List all of the molecules in the process translation.
- 8 Translation takes place in the _____.

Part B

- 9 Define transcription.
- 10 List all of the molecules in the process transcription.
- 11 Transcription takes place on the _____.

General Question

- 12 What is the purpose of protein synthesis?